WHAT IS CLAIMED IS:

1. An apparatus for processing a surface of an inhabitable structure, the apparatus comprising:

a laser base unit adapted to provide laser light to an interaction region, the laser light removing material from the structure, the laser base unit comprising a laser generator and a laser head coupled to the laser generator, the laser head adapted to remove the material from the interaction region, thereby providing reduced disruption to activities within the structure;

a laser manipulation system comprising:

an anchoring mechanism adapted to be releasably coupled to the structure, and

a positioning mechanism coupled to the anchoring mechanism and coupled to the laser head, the laser manipulation system adapted to controllably adjust the position of the laser head relative to the structure; and

a controller electrically coupled to the laser base unit and the laser manipulation system, the controller adapted to transmit control signals to the laser base unit and to the laser manipulation system in response to user input.

2. The apparatus of Claim 1, wherein the laser head is releasably coupled to the laser generator and releasably coupled to the positioning mechanism, the positioning mechanism is releasably coupled to the anchoring mechanism, and the controller is releasably coupled to the laser base unit and the laser manipulation system, whereby the apparatus can be reversibly assembled and disassembled to facilitate transportation of the apparatus to locations in proximity to or within the structure.

3. The apparatus of Claim 1, wherein the laser base unit comprises a cooling subsystem coupled to the laser generator, the cooling subsystem adapted to remove heat from the laser generator.

4. The apparatus of Claim 3, wherein the cooling subsystem comprises a site-supplied cooling water source.

5. The apparatus of Claim 3, wherein the cooling subsystem comprises a unitary cooling unit.

6. The apparatus of Claim 1, wherein the laser generator comprises an arc-lamp-pumped Nd:YAG laser.

7. The apparatus of Claim 1, wherein the laser generator comprises a laser selected from the group consisting of: a CO_2 laser, a diode laser, an arc-lamp-pumped Nd:YAG laser, a diode-pumped Nd:YAG laser, and a fiber laser.

8. The apparatus of Claim 1, wherein the laser head comprises laser optical elements adapted to receive laser light from the laser generator and to direct the laser light to the interaction region.

9. The apparatus of Claim 1, wherein the laser head is coupled to a cooling subsystem adapted to remove heat from the laser head.

10. The apparatus of Claim 1, wherein the laser generator and the laser head are coupled to a cooling subsystem adapted to remove heat from the laser generator and the laser head.

11. The apparatus of Claim 1, wherein the laser head comprises a containment plenum adapted to confine the material and to remove the material from the interaction region.

12. The apparatus of Claim 11, wherein the containment plenum is further adapted to reduce noise and light emitted out of the containment plenum from the interaction region.

13. The apparatus of Claim 11, wherein the containment plenum is coupled to a cooling subsystem adapted to remove heat from the containment plenum.

14. The apparatus of Claim 11, wherein the containment plenum comprises an extraction port which provides a pathway for removal of the material from the containment plenum.

15. The apparatus of Claim 11, wherein the containment plenum comprises a resilient interface adapted to contact the structure and to substantially surround the interaction region, thereby facilitating confinement and removal of material from the interaction region.

16. The apparatus of Claim 15, wherein the resilient interface comprises a wire brush.

17. The apparatus of Claim 1, wherein the laser head comprises a nozzle fluidly coupled to a compressed gas supply, the nozzle adapted to direct a compressed gas stream to the interaction region.

18. The apparatus of Claim 1, wherein the laser head comprises a sensor adapted to measure the relative distance between the laser head and the interaction region.

19. The apparatus of Claim 18, wherein the sensor is coupled to the controller, and the controller is adapted to transmit control signals to the laser base unit in response to signals from the sensor, and the laser base unit is adapted to adjust one or more parameters of the laser light in response to the control signals.

20. The apparatus of Claim 18, wherein the sensor is coupled to the controller, and the controller is adapted to transmit control signals to the laser manipulation system in response to signals from the sensor, and the laser manipulation system is adapted to adjust the relative distance between the laser head and the interaction region in response to the control signals.

21. The apparatus of Claim 18, wherein the sensor comprises at least one sensor from the group consisting of: an acoustic sensor, an infrared sensor, a tactile sensor, and an imaging sensor.

22. The apparatus of Claim 1, wherein the controller contains statistical data regarding the relationship between laser parameters and the relative distance between the laser head and the interaction region, the controller adapted to determine the relative distance using the statistical data and laser parameters.

23. The apparatus of Claim 1, wherein the laser head comprises a proximity sensor electrically coupled to the controller and adapted to provide a fail condition signal to the controller upon detection of the relative distance between the laser head and the structure exceeding a predetermined distance.

24. The apparatus of Claim 1, wherein the anchoring mechanism comprises one or more resilient vacuum pads coupled to at least one vacuum generator.

25. The apparatus of Claim 1, wherein the anchoring mechanism comprises a ground-based support connector adapted to be releasably attached to a ground-based support system.

26. The apparatus of Claim 1, wherein the anchoring mechanism comprises a suspension-based support connector adapted to be releasably attached to a suspension-based support system.

27. The apparatus of Claim 1, wherein the positioning mechanism comprises:

a first-axis position system adapted to move the laser head along a first direction substantially parallel to the surface; and

a second-axis position system adapted to move the laser head along a second direction substantially parallel to the surface and substantially perpendicular to the first direction.

28. The apparatus of Claim 27, wherein the first-axis position system is releasably coupled to the second-axis position system, and the laser head is releasably coupled to the second-axis position system.

29. The apparatus of Claim 27, wherein the first-axis position system comprises a first rail and a first drive and the second-axis position system comprises a second rail and a second drive.

30. The apparatus of Claim 29, wherein the first rail is releasably and rotatably coupled to the anchoring mechanism, the second rail is releasably and slidably coupled to the first rail, and the laser head is releasably and slidably coupled to the second rail.

31. The apparatus of Claim 29, wherein the first drive and the second drive are each selected from the group consisting of: hydraulic drive, pneumatic drive, electromechanical drive, screw drive, and belt drive.

32. The apparatus of Claim 27, wherein the positioning mechanism further comprises a third-axis position system adapted to move the laser head along a third direction substantially perpendicular to the first direction and the second direction.

33. The apparatus of Claim 1, wherein the controller comprises a microprocessor.

34. The apparatus of Claim 1, further comprising a detector coupled to the controller and adapted to detect embedded material in the structure while processing the structure, and to transmit detection signals to the controller, the controller adapted to avoid substantially damaging the embedded material by transmitting appropriate control signals to the laser base unit and the laser manipulation subsystem.

35. The apparatus of Claim 34, wherein the detector is adapted to detect embedded material by using light emitted by the interaction region during processing.

36. The apparatus of Claim 35, wherein the detector uses spectroscopic information of the emitted light.

37. The apparatus of Claim 35, wherein the detector determines a temperature corresponding to the emitted light.

38. The apparatus of Claim 35, wherein the detector comprises a high-speed shutter and a camera, the detector using imaging data obtained from the interaction region.

39. An apparatus for processing a surface of an inhabitable structure with reduced disruption to activities within the structure, the apparatus comprising:

means for generating laser light;

means for providing the laser light to an interaction region of the structure to remove material from the structure;

means for confining the material and removing the material from the interaction region;

means for controllably adjusting a position of the interaction region relative to the surface of the structure; and

means for controlling the laser light and the position of the interaction region in response to user input.

40. A method of processing a surface of an inhabitable structure with reduced disruption to activities within the structure, the method comprising:

remotely generating laser light;

providing the laser light to the surface, the laser light interacting with the structure in an interaction region to remove material from the structure;

confining the material and removing the material from the interaction region;

controllably adjusting a position of the interaction region relative to the surface of the structure; and

controlling the laser light and the position of the interaction region in response to user input.

41. An apparatus for processing a surface of an inhabitable structure, the apparatus comprising:

a base unit adapted to provide energy waves to an interaction region, the energy waves removing material from the structure, the base unit comprising a generator and a head coupled to the generator, the head adapted to remove the material from the interaction region, thereby providing reduced disruption to activities within the structure;

a manipulation system comprising:

an anchoring mechanism adapted to be releasably coupled to the structure, and

a positioning mechanism coupled to the anchoring mechanism and coupled to the head, the manipulation system adapted to controllably adjust the position of the head relative to the structure; and

a controller electrically coupled to the base unit and the manipulation system, the controller adapted to transmit control signals to the base unit and to the manipulation system in response to user input.

42. The apparatus of Claim 41, wherein the energy waves are laser light.

43. The apparatus of Claim 41, wherein the energy waves are electromagnetic waves.

44. The apparatus of Claim 41, wherein the energy waves are ultrasonic waves.

45. The apparatus of Claim 41, wherein the energy waves are acoustic waves.